

XX.—On a new *Labyrinthodont Amphibian* from the Northumberland Coal-field, and on the occurrence in the same locality of *Anthracosaurus Russellii*. By ALBANY HANCOCK, F.L.S., and THOS. ATTHEY.

WE have recently obtained from the black shale associated with the Low-main seam at Newsham Colliery, in the neighbourhood of Newcastle-upon-Tyne, the remains of a small amphibian belonging to Prof. Huxley's genus *Urocordylus*\*. This is the second generic form that has occurred to us in this locality of the interesting series described by that learned palæontologist from the Jarrow Colliery, in the county of Kilkenny, Ireland. We propose to name this species *Urocordylus reticulatus*. We have adopted the specific denomination *reticulatus* as expressive of the reticulated structure of the surface of the cranial bones. The specimen now before us is composed of the head and twenty-three or twenty-four vertebræ in a continuous series; the dorsal aspect of the head is exposed to view, and the vertebræ lie with their left sides uppermost. The entire length of the specimen is  $2\frac{1}{4}$  inches. The head, which is much crushed and injured by the fracture of the bones, is of a subtriangular form, with the posterior region truncated, and tapering in front to a short rounded snout; and there are two large curved horns projecting backwards from the occipital region, like those of *Keraterpeton*†. In Prof. Huxley's species, the horns were not observed; but this is not to be wondered at, for the head was in a very bad state of preservation. In our specimen, too, the bones are so much broken up that it is impossible to determine their forms; the surface, however, of several of them is in excellent condition, and exhibits, in the most distinct manner, a coarse reticulated structure of elevated ridges or lines, which, from the elongation of the meshes in some of the bones, have the appearance of strong, raised, parallel striæ. The head measures from the snout to the occipital margin  $\frac{4}{10}$  in., in width at the broadest part  $\frac{5}{10}$  in.; the horns are  $\frac{2}{10}$  in. in length.

Two or three teeth are distinguishable in one of the mandibles, but are somewhat injured; they are small, have the sides nearly parallel, and are slightly curved; the apices are apparently abruptly pointed. The sternal plates are distinctly displayed, but are in a much disturbed condition; all the three, however, can be made out, two of them being much

\* "On a Collection of Fossil Vertebrata from the Jarrow Colliery, County of Kilkenny, Ireland," by Thos. H. Huxley and E. Perceval Wright (Trans. Royal Irish Academy, 1867, vol. xxiv.).

† See *op. cit.*

mutilated. They lie immediately behind the head, at the left side of the specimen, towards the ventral aspect; two are a little in advance of the third. They all have the surface covered with a minute reticulation of raised lines, which assume a radial disposition, as if from centres of growth. Behind the plates, on the left or ventral side of the body, there is a sort of roll, as it were, extending some way backwards, which seems to be composed of minute elliptical scales; they are, however, very indefinite; their exact form could not be determined.

The vertebræ, of which there are twenty-three or twenty-four, are very apparent, but their precise form is rather difficult to make out; they are nevertheless in regular order, but are somewhat obscured by the matrix. They each bear a long, compressed or flattened, plate-like dorsal spine, which is as high or a little higher than the centrum; its dorsal or free margin is truncated and serrated; below it is contracted in the antero-posterior direction, and, expanding above, somewhat resembles a fan, the resemblance being heightened by the strong radiating striæ that cover the sides. They are very similar to the vertical processes of *Urocordylus Wandesfordii*, but more particularly agree, in proportion and character, with the subvertebral bone or spine. The three or four terminal posterior vertebræ have in addition subvertebral bones similar in form and size to the dorsal spines. From this fact it would appear that these three or four vertebræ belong to the tail; and if the new species is as rich in caudal vertebræ as *U. Wandesfordii*, our specimen must have lost at least seventy of the bones of its tail. *U. reticulatus* has therefore about twenty trunk or precaudal vertebræ, the number that is found in Prof. Huxley's species. The vertebræ are about  $\frac{1}{10}$  inch in length, and in height  $\frac{1}{6}$  inch, including the dorsal spine; the height of the caudal vertebræ, measuring from the upper margin of the dorsal spine to the lower margin of the subvertebral bone, is  $\frac{1}{4}$  inch. The zygapophyses project laterally as well as forward and backward.

There are slight indications of anterior and posterior limbs; but the appearances are too vague to be worthy of further notice, beyond that a fragment of bone seems to mark the place of the posterior limb near the termination of the trunk-vertebræ. And not far from this point there is also a small bone, which is probably one of the phalanges.

The length of the specimen, including the head and trunk-vertebræ, is only one-fourth that of the same parts of *U. Wandesfordii*; we may therefore conclude that the latter species is four times the size of *U. reticulatus*. When perfect,

*U. Wandesfordii* is upwards of 18 inches long; consequently the new species would measure  $4\frac{1}{2}$  inches if entire.

*U. reticulatus* is evidently closely related to *Keraterpeton*, as is proved by the form of the head, the two occipital cornua, and also by the character of the sternal plates; so close, indeed, does this relationship appear to be, that we have some doubt whether it should not be placed in that genus. It is true that no occipital horns were observed in *U. Wandesfordii*; but the skull of Prof. Huxley's specimen was so much crushed and disturbed that much stress cannot be placed on this negative fact; and the vertebræ of our species resemble more closely those of *Urocordylus* than they do those of *Keraterpeton*. Moreover in the latter form there is a perceptible diminution in the size of the nineteenth vertebra, and so on to the tail, while in our species the last of the three caudal vertebræ, the twenty-third or twenty-fourth, is as large as any of the trunk-vertebræ, agreeing in this respect with *Urocordylus*, and signifying that *U. reticulatus* has a long and powerful tail, which is the characteristic feature of the genus. We have therefore provisionally placed our new species in that genus.

Another question arises, Is *U. reticulatus* a distinct species? or is it merely the young of *U. Wandesfordii*? We believe it to be distinct, because the vertical processes of the vertebræ, though strongly resembling those of that species, differ considerably from them in certain particulars. The character of the sternal plates is also different, and the surface-structure of the cranial bones is apparently peculiar; but it must be allowed that this feature may be wanting in *U. Wandesfordii* merely on account of the curious state of preservation of the specimen from which that species was described. But be this as it may, the interest of this discovery is not lessened; and, indeed, this addition to the coal-fauna of the district is the most important that has been made since our acquisition in 1867 of *Ophiderpeton*, another of Prof. Huxley's genera from the Kilkenny coal-shales. And we cannot but deem ourselves fortunate in having met with this new species of so rare a form of Labyrinthodont Amphibian; for much novelty is not now to be expected from the shales of Newsham and Cramlington, which have been assiduously searched for the last fifteen years.

#### *Anthracosaurus Russellii*, Huxley.

A large fragment of the skull of this rare fossil was obtained a short time ago at Newsham; it is a portion of the anterior part of the cranium, and happily exhibits characteristic features that cannot well be mistaken. The snout is wanting, being

broken off diagonally backwards from left to right; and posteriorly the specimen is broken away in a parallel diagonal line a little behind the great vomerine tusks; so that on the right side nearly the whole of the maxilla is present; on the left the fracture passes close to the base of the large vomerine tusk, consequently the maxilla of this side is almost entirely wanting. In form the specimen is rhomboidal, being diagonally broken across before and behind; the sides are perfect; it measures lengthwise  $3\frac{1}{2}$  inches, in breadth 6 inches.

Both the dorsal and palatal surfaces have been cleared of the matrix, a work of much care and labour; and though the parts are crushed and distorted, many of the characters are well preserved. The sculpture of the bone on the dorsal surface is distinctly displayed, and is of the usual Labyrinthodont character, resembling very closely that of *Pteroplax*; but the pits or depressions are less regular, and the surrounding ridges are rough and much broken up. The frontal bones are broken away before and behind, but the greater part of them is evidently present; they are considerably elongated, and are a little expanded in front. A triangular bone, with its apex forward, is interposed on either side between the frontals and the maxillæ; these bones are probably the postfrontals, or they may be the prefrontals and the postfrontals in combination. On the left side a fragment, probably of the nasal bone, is wedged in in front, between the anterior extremity of the frontal and the maxilla. The sutures are represented by wide, smooth, depressed lines, but, with the exception of those of the frontals, they are not very easily determined.

The other side of the specimen exhibits the roof of the mouth, but the bones are so much crushed and broken that it is impossible to make out their forms and limits. Suffice it to say that, a little in front of the great vomerine tusks, there is, on each side, a large deep depression (which two depressions are undoubtedly the anterior palatal foramina), and that immediately behind and towards the outer margin of the right vomerine tusk a circular depression, upwards of half an inch in diameter, indicates the position of the right posterior naris.

The teeth belonging to the fragment are nearly all present; but many of them are broken down and displaced, and only a few retain their apices. The two great vomerine tusks are not much disturbed; that on the right side stands erect, but a large portion of the crown has disappeared. It is placed somewhat nearer to the maxilla than to the central line of the skull, and is not very far from the anterior margin of the specimen; what remains of it is  $\frac{5}{8}$  inch in height, and it measures across the widest part of the base  $\frac{7}{8}$  inch. The left vomerine

tusk is crushed down close to the posterior margin of the specimen, with its base near its proper position, not far from the maxilla, and the apex pointing inwards: it is broken across near to the middle; and the basal portion overlies, to some extent, the upper part. When perfect, this tusk could not be less than two inches long, and is about an inch wide at the base.

Four teeth, upwards of half an inch long, lie upon the base of this large tusk, and another, about the same size, lies pressed down a little in front of it; these have their bases attached to the maxilla, and are the only maxillary teeth of this side, a very small portion of the maxilla being present. In front of these teeth a short space intervenes between them and the base of a large tooth, which stands erect, and is  $\frac{3}{8}$  inch in diameter; the crown lies pressed down in contact with the basal portion, and with it measures nearly an inch in length. A large depression is immediately in advance of this tooth, separating it from two other teeth equally large, or, perhaps, a little larger, which are crushed down confusedly, one over the other, at the anterior extremity of the specimen. These three large teeth would seem to belong to the premaxilla. The teeth of the maxilla of the right side are well displayed; they stand up, for the most part arranged along the alveolar ridge with their crowns (some of which are perfect) inclined backward and inward. There are thirteen of these teeth; they vary somewhat in size, and commence in front in a line with the base of the vomerine tusk. The first seven are placed close together; the first and seventh are larger than the rest, and are  $\frac{1}{4}$  inch wide at the base; two or three of the smaller have the crown complete; when perfect, the large ones must have been upwards of half an inch long. A short space now intervenes in the series, and then there is a cluster of four more teeth, three of which are rather large and one small, the latter being placed between the first and second of the three; all their crowns are broken off; the bases of the three larger measure  $\frac{1}{4}$  inch in diameter. Behind these is a large depression; and then the series is terminated by the two last teeth, the twelfth and thirteenth, which are placed near to each other. All that remains of the former is a very short stump, almost  $\frac{1}{4}$  inch in diameter; the latter is apparently quite small, and is represented by a mere fragment, which is placed close to the fractured margin of the specimen.

In number and size the teeth do not exactly correspond to those of the specimen from the Lanarkshire coal-field described by Prof. Huxley\*; but the disparity in these respects does

\* Journal of the Geological Soc. vol. xix. p. 56, 1863.

not amount to much. In the Scotch specimen there are thirteen teeth described in the left præmaxilla and maxilla, while nineteen are enumerated as attached to the same bones of the right side. In our specimen there are thirteen maxillary teeth on the right side and three præmaxillary teeth on the left, one or two apparently being wanting. So it would seem that the Newsham specimen, when perfect, had, in all probability, sixteen or seventeen teeth in the upper jaw on each side; but as the number in the two sides does not apparently agree in the Scotch specimen, our specimen may have had two or three teeth more or less on either side, thus altering the number to thirteen or nineteen, as in the specimen described by Prof. Huxley.

The palatal teeth, however, are wanting in the Newsham specimen. On the left side, the bone to which they are attached is broken away; but on the right side there is a ridge behind the vomerine tusk, which, perhaps, may be the alveolar plate; if so, the teeth have been removed; there are, however, some fragments in the vicinity, which possibly belong to the palatal teeth of this side.

The teeth on the whole are somewhat less than those of the Scotch specimen, and this disagreement cannot be accounted for by the difference in size of the skulls. The Scotch skull is 5·3 inches in width opposite the vomerine tusks. Our specimen measures across the same region 5·5 inches; so the latter would appear to be the larger of the two. But this is probably not the case, for our fragment seems to be a little widened by pressure. The skull, however, of our specimen, when perfect, could not be much, if at all, smaller than that described from Scotland, which is stated to be 15 inches long, and 12 inches wide at the widest part. That they were of nearly equal size is apparently confirmed by the dimensions of the vomerine tusks.

Those of the Newsham specimen seem to be quite as large as those of the Scotch specimen; in both they are about equal in diameter at the base. It is true that Prof. Huxley estimates their length in the Scotch specimen to be 3 inches, while, judging from the fragments, we have calculated that the left tusk in our specimen could not be less than 2 inches long; but how much longer it may have been we cannot determine. It is certain that the two fragments into which it is broken, when taken together, measure upwards of 2 inches in length; and it is impossible to say how much the basal portion overlies the upper; moreover, the latter is bent, and the apical extremity is wanting. We think, then, that the disparity in the number and size of the teeth and tusks is not

sufficient to cause us to doubt the specific identity of the two specimens in question.

We must now turn to the character of the teeth themselves. In our specimen they have the same irregularly rounded base as those of the Scotch specimen; and like them they are, towards the apex, a little flattened, giving to the section of the crown an elliptical contour, the long axis being in the direction of the jaw; and on the frontal and dorsal aspects they are slightly carinated. So far the teeth agree; but Prof. Huxley describes the surface of those in his specimen as ridged, not grooved, while in ours they may be said to be both grooved and, to some extent, ridged. The base of the teeth, when in a good state of preservation, exhibits narrow, shallow grooves, the interspaces being comparatively wide and usually a little prominent, though sometimes almost flat. This difference in the two instances is, perhaps, of not much importance, and may be accounted for by the peculiar state of preservation of the specimens: we shall shortly endeavour to show that this is the fact; in the meantime we will say a few words on the internal structure of the teeth. In this respect there is also some slight difference; our sections of the teeth and those described by Prof. Huxley do not exactly agree. The only difference of any consequence, however, can be explained, we think, by supposing that the sections were made from different parts of the tooth. In *Pteroplax*, the pulp-cavity, near the root of the tooth, is radiated, as it is in *Anthracosaurus*; a little nearer the base the radial spaces are wider, a little further up they are contracted, and still higher up they are contracted more, and ultimately they are lost, and the cylindrical form of the pulp-cavity established. We may therefore presume that the sections described by Prof. Huxley were made near to the base of the tooth in *Anthracosaurus*, and consequently the radial form of the pulp-cavity was strongly developed. Our sections are from higher up the tooth; and the result is, that the radiation of this cavity is very imperfect and in part obliterated. In other respects the structure appears to agree with Prof. Huxley's description: but this observation applies only to the general arrangement of the parts; for, as the learned Professor remarks, "the details could only be made intelligible by elaborate figures," and such were not given.

In Mr. Atthey's collection there is a portion of a right mandible which was obtained at Newsham, and which we originally thought belonged to *Pteroplax*, but which we now have no doubt belongs to *Anthracosaurus*. The surface-sculpture of the bone, the general form, character, and internal

structure of the teeth demonstrate this since we have become acquainted with these features in that genus.

The fragment, which is upwards of  $2\frac{1}{4}$  inches long,  $1\frac{1}{2}$  inch wide behind, and  $\frac{3}{4}$  inch wide in front, is the anterior portion of the right mandible; it has attached to it five teeth; in front it is perfect; the posterior portion is broken away close to the fifth tooth, which, though much injured, appears to be about half an inch long. The three next in advance are not quite so long, and are separated from the fifth and from each other by considerable spaces, and from the tooth in front by a space  $\frac{5}{8}$  inch in length. This frontal tooth, which is perfect, is half an inch long and  $\frac{3}{10}$  inch wide at the base; it is placed a little way from the extremity, where there is a depression, but whether for the reception of the base of a tooth cannot be determined. The surface of the teeth is ridged, particularly towards the base, agreeing in this respect with those in the Scotch specimen; they are a little compressed above; and one, which is tolerably perfect, has the apex slightly carinated.

On making a section of one of the teeth, it is quite obvious that the ridges on the surface are owing to erosion, if not entirely, at least mainly, and that the internal structure agrees very well with that of *Anthracosaurus* when allowance is made for the variation caused by the sections not being made at the same part. Our section was made a little way up the tooth, while those of the Scotch specimen were, as we have already explained, evidently made close to the base.

There can therefore be little doubt that this fragmentary mandible really belongs to *Anthracosaurus*. We have, then, the satisfaction of recording the occurrence in the Northumberland coal-field not only of a considerable portion of the cranium, but likewise of a large fragment of the jaw of this rare fossil.

The large sternal plate, nearly 5 inches long, described in our paper on *Pteroplax*\*, is probably that of *Anthracosaurus*; it was found in the same locality, and this is the only large Labyrinthodont occurring in the Newsham shale to which it can at present be assigned. We also possess some ribs and vertebræ which perhaps belong to the same animal.

XXI.—On *Grayella cyathophora*, a new Genus and Species of Sponges. By H. J. CARTER, F.R.S. &c.

[Plate VII.]

ABOUT a fortnight since, Dr. J. E. Gray kindly sent me a specimen of a marine sponge, with the request that I would

\* See Annals of Nat. Hist. ser. 4. vol. i. p. 277.